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Indian Railways

By

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# INDIAN RAILWAYS.

385.54 No. I. DOUBLE AND SINGLE LINE.

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*(From the Times of India, September 5, 1866.)*

It is unquestionably of great importance to supply India with a complete and efficient railway system, so as to bring markets nearer to consumers and induce the greatest possible cultivation of the land. Probably a desire to deal cautiously with the subject led to the adoption of single instead of double lines, the object being to incur the least possible expense under the 5 per cent guarantee. Possibly the Government did not contemplate the necessity for great speed or quick delivery of goods as on European railways. The intention may have been rather to facilitate the ordinary transit of troops, to test the effect of long single lines in developing the country, and to see whether the native merchants and travellers would use the railway or be prevented by caste prejudices from doing so. Happily for India, its people have accepted railways, and are so fully alive to their advantages that steadily and surely the demand is arising for the full results produced by European railways with double lines. It seems, however, to have been supposed and propounded that the fullest amount of work has been obtained from the Indian single lines, seeing that demand has arisen for the lines to be doubled. In fact the pressure has been so strong on the part of the public that it has been necessary to assign some cause and a remedy. It would seem that no committee of inquiry can have been held in order to investigate the maximum tonnage capacity of single lines; and hence owing to a general perplexity and want of knowledge the only escape from the difficulty has been to insist upon the necessity of double lines. A meeting of merchants at Calcutta lately passed a resolution demanding the doubling of the whole of the East Indian Railway, which the Chairman of the Company at the half-yearly meeting in London in June stated would cost £6,000,000 sterling, including the necessary extra rolling stock.

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The doubling of a portion of the East Indian by a chord line, and the doubling of 233 miles on the Great Indian Peninsular, indicate the policy to which the Government and the Indian companies have felt bound to commit themselves.

It is my intention to discuss the prudence of developing this policy, and to consider whether the Indian single lines have yet been worked up to their full carrying capacity, and if the sections of line to be doubled have been selected on such principles as to produce the best attainable results.

It is indisputable that a double line of railway is easier to work and more certain in its results than a single line ; but it is very questionable whether that policy or legislation is wise which saddles the people of this country with a large additional tax and a liability to pay 5 per cent guarantee on additional English capital for double lines, when the capital already invested in single lines does not yield that 5 per cent guarantee.

The Indian single lines were originally designed to cost £8,000 to £10,000 per mile. Year by year Mr. Juland Danver's blue-book report to the Indian Secretary of State has shown an increase of capital and an increased cost per mile. The following statement up to April 1865, shows the cost per mile made up from the capital sanctioned by Government from year to year as the then estimated capital required to complete the several undertakings :

| Railway Companies.     | 1860     | 1861     | 1862     | 1863     | 1864     | 1865     |
|------------------------|----------|----------|----------|----------|----------|----------|
|                        | per mile | per mile | per mile | per mile | per mile | per mile |
|                        | £        | £        | £        | £        | £        | £        |
| East Indian.           | 14,200   | 16,862   | 16,862   | 18,079   | 19,357   | 20,053   |
| Great I. P...          | 9,478    | 9,478    | 9,478    | 9,478    | 12,638   | 12,638   |
| Madras ....            | 10,000   | 10,000   | 10,000   | 10,000   | 11,764   | 11,764   |
| Bombay B. & C. I. .... | 8,064    | 11,290   | 12,903   | 14,516   | 17,628   | 19,230   |

This shows the gradual increase of cost found requisite from year to year ; and there is every reason to believe that such growing increase will go on for a few years more until the trunk system is completed. When it is borne in mind, that for every million sterling extra, the Indian budget is saddled with an additional *yearly liability* to pay £50,000—the 5 per cent guarantee thereon—it becomes a matter of some importance that the capital should not unnecessarily be increased, unless its outlay be decidedly remunerative. Although much may be expected from the Indian lines in the future, if a wise policy is pursued, yet during the last 14 years up to April 1865, £13,160,538 have been advanced from Indian finances for guaranteed interest payable on railway capital, and only £3,300,000 have been repaid by the companies — leaving 10 millions sterling, or equal to about half a year's Indian land revenue, for which the companies are responsible to Government. Certainly this is not an overwhelming

sum for the State to lose in return for the advantages of a trunk system of railways, even if it should never be repaid ; but looking at the fact that the lines cannot, now that the American war has ceased, be depended upon to permanently earn 5 per cent on the capital already expended, the cost will not stop at 10 millions, as the 5 per cent guarantee is a standing charge from year to year, or such proportion of it as may not be earned by the different lines. Mr. Juland Danvers estimated that, by January 1866, the current year's interest to be paid out of Indian finances would be £2,700,000. To what amount may we expect this charge will increase, if the policy of double lines is pursued simultaneously with the almost certain yearly decrease of cotton to be exported ?

If double lines are necessary, it must then be confessed that Indian single lines have cost such a large amount per mile that sufficient traffic cannot be worked over them as single lines to pay 5 per cent. This is the serious feature of the case. If such be admitted, then the sooner all the lines are doubled the better. The Government could then take them over, consolidate the capital, and perhaps borrow the money at 4 per cent ; it would then be known what India would have to pay for her railways. There cannot be any doubt that the time has arrived when a decision must be come to as to whether the system of single lines can or cannot be made to suit India. No doubt they can ; but the policy of doubling by chord lines and by continuous additions of the double line points to the reverse opinion being held. If double lines are necessary then arises the question,—Will there be a permanent traffic sufficient to occupy double lines or partly double lines, and to pay the unremunerative portion of cost of the single lines and the extra cost of doubling ?

The Indian system of long single lines of railway, so rapidly growing longer and longer, and therefore more unmanageable, is a system unknown in England, and to the generality of English trained railway men. The groundwork of the English system was borrowed from the old road carrying system of Pickford and Co. and Chaplin and Horne. Wherever their system could be engrafted on to the railway system it was done, although at the present time the railway system has so expanded as to bear very slight traces of its parentage. No attention has been devoted by English railway managers to working long single lines, because there are no such lines in England ; hence India cannot borrow from England any experience as to the working of her long single lines ; neither can England offer any data as to the maximum amount of traffic workable over a long single line. The only course,



then, open to India is to exercise her own ingenuity, or to seek experience in countries possessing systems of single railway like unto her own. Canada and the United States are the countries that offer the best opportunity for a comparison in this respect. I propose, therefore, to draw a comparison between the Indian and the Canadian and American systems, in order to prove that the Indian single lines are not worked up to their full tonnage capacities, owing to the outside executive working arrangements being inferior to the Canadian and American, which latter railways admit the passage of a larger tonnage of goods traffic.

To work the greatest possible number of trains, consisting of the greatest possible number of fully loaded waggons or carriages, is, of course, the end sought. As the quickness in the passage of trains and their punctuality can be increased, so in the same ratio can the number of trains be increased. Hence the system of out-door executive which will add most to this result must be the best, provided that safety is secured, and excessive, and consequently expensive and dangerous speeds avoided. Passenger trains being of the most importance have the preference; and hence no difficulties arise on single lines in meeting their requirements. The difficulties arise in multiplying the necessary number of goods trains in addition to passenger trains. Directors and shareholders at the half-yearly meetings in England have drawn comparisons as to the extent of traffic carried upon Indian railways by quoting the amount of money earned per mile per week or per half year. The Chairman of the East Indian at the meeting in London in June says:—"Everybody who has any acquaintance with railway administration must know, in the case of a long line of railway, that £40 per mile per week is a very large amount of traffic." This test, however, is not a true criterion, because rates vary in different countries, and ten or twenty per cent advance in rates will, on a long line, show a considerable increase of money earned per mile per week, which is no indication that more tons have been carried or more trains run. The only true criterion of the extent of traffic carried over a line is the train mileage and the number of tons carried. This is a measure of quantity, while the other is simply a measure of money. The one shows *the extent of the work*; and the other the revenue earned, with the possible profit for dividend.

The following table is a comparison of a few of the longest Canadian and American lines with the Indian, showing the tonnage and mileage for a half year or the amount of work done:—

| Railway Company   | Period.                                | Length of Rail-<br>way Miles. | Weight<br>Tons. | Goods<br>Train<br>Mileage | No of miles run to<br>each ton carried. |
|---|--|-------------------------------|-----------------|---------------------------|---|
| New York & Erie.  | Half of year end-<br>ing Sept. 1863... | 459                           | 794,105         | 1,807,643                 | 2 $\frac{1}{4}$                         |
| New York Central  | Do. Do. ..                             | 555                           | 634,202         | 1,673,622                 | 2 3-5                                   |
| Hudson River ....                                       | Do. Do. ..                             | 144                           | 287,423         | 363,211                   | 1 $\frac{1}{4}$                         |
| Great Western of<br>Canada .....                        | Do. Jan. 1857..                        | 283                           | 107,136         | 267,161                   | 2 $\frac{1}{4}$                         |
| East Indian .....                                       | Do. June 1864..                        | 701                           | 280,058         | 864,707                   | 3                                       |
| Do. ....  | Do. Dec. 1864..                        | 1105                          | 305,235         | 1,033,166                 | 3 $\frac{1}{4}$                         |
| Great Indian Pe-<br>ninsula .....                       | Do. Dec. 1865..                        | 601                           | 297,930         | 662,843                   | 2 $\frac{1}{4}$                         |
| Bombay, Baroda &<br>C. India.....                       | Do. Do. ..                             | 306                           | 55,920          | 142,847                   | 2 $\frac{1}{2}$                         |
| Madras .....  | Do. Do. ..                             | 610                           | 193,126         | no re-<br>turns           | ..                                      |
| Inverness & Aber-<br>deen Junction of<br>Scotland ..... | Half of 1864. ..                       | 233                           | 152,935         | 145,205                   | 1                                       |

Note.—An allowance has been made for the American ton consisting of only 2,000 lbs.

This comparison shows that, for the number of tons carried, no unreasonable number of train miles have been run, and that American and Indian lines are in this respect about equal. Unless this fact is shown, it would not be fair to say that the American lines show a larger train mileage, proving that more trains were run; as it might be argued that an extravagant train mileage had been run without an equivalent weight of traffic being carried.

The following table shows the total train mileage from the published reports for the same half years as specified above. It must, however, be borne in mind that no allowance has been made either on the Indian or American lines for some short sections of both systems being double. The information at hand does not furnish this accurately as to the American lines; but my firm belief is, from personal knowledge of the lines quoted, that, excepting the Great Western of Canada, the other lines have more short sections of double line than the Indian Railways now possess, and a little allowance must consequently be made for this in considering the following figures:—

| Railway Companies.               | Total train mileage Goods and Passengers for half year. | Average number of train trips per half year from end to end of line on total train mileage. |
|----------------------------------|---|---|
| New York & Erie .....            | 2,542,286   | 5,538   |
| New York Central.....            | 2,625,076   | 4,729   |
| Hudson River .....               | 642,418   | 4,461   |
| Great Western of Canada .....    | 730,295   | 2,580   |
| East Indian.....                 | 1,374,160   | 1,960   |
| Do. ....                         | 1,767,609   | 1,599   |
| Great Indian Peninsular.....     | 1,081,258   | 1,799   |
| Bombay, Baroda & C. I. ....      | 329,285   | 1,076   |
| Madras .....                     | 736,090   | 1,206   |
| Inverness and Aberdeen Junction. | 426,093   | 1,828   |

It will be seen from this that the American lines, while not running more miles for each ton carried, exceed the Indian lines in an astonishing degree in the number of train miles, and average train trips from end to end of line. By dividing the total train mileage for the half year by the length of the line, we get the average number of trains that could possibly have run from end to end of each line.

The Indian published returns will show far more trains ; but it must be borne in mind that some lines are cut up into districts, and a train counts as one over each district ; hence one train load of wagons will count as five or six trains according to the number of districts it passes over.

In considering which Indian line shows the best results, it must be assumed that each line has had more traffic than it could carry, but that its outdoor executive management produced the maximum results possible under the system and the circumstances. If either line carried all the traffic offered to it—which was perhaps the case with the B. B. C. I.—then, although its train trips appear small, the line did all the work required of it.

The East Indian appears to show badly, both as to number of train trips and miles run to each ton of goods carried. It is probable that this is owing to the effect of the present system showing worse results as the length of a line increases.

The following table will show what extra tonnage the Indian lines would have carried for the half year ending Dec. 1865, had they made an equal number of train trips as the New York Central line :—



Return showing the increased number of Tons the Indian Railways might have carried, had they made during the half year ending December 1865, the same number of train trips as the New York Central Railway :—

| Railway Companies.       | Average No. of train trips per half year from end to end of line on total train mileage. | Tons actually carried as per tables above | Tons additional that might have been carried had the trips been 4,729, same as N. Y. Central, and counting each extra trip as one train of 80 tons. | Per cent. increase. |
|--------------------------|--|---|---|---------------------|
| East Indian..            | 1,960  | 280,058                                   | 221,520   | 79                  |
| Do. ..                   | 1,599  | 305,235                                   | 250,400   | 82                  |
| Great Indian P. ....     | 1,799  | 297,930                                   | 234,400   | 78                  |
| Bombay Baroda & C. I.... | 1,076  | 55,920                                    | 292,240   | ..                  |
| Madras .....             | 1,206  | 198,126                                   | 281,840   | ..                  |

In the face of these facts there seems little doubt that, owing to the out-door or executive management (as it may be termed), more work is got out of American single lines than the out of Indian ; hence would it not be wise for a committee of inquiry to be held by the Government and the different Companies before expending immense sums on double lines ?

In the United States there are over 34,000 miles of railway, and four lines out of five have not a mile of double line ; hence we must look to Canada and the United States to find the basis for a complete system of working our long single lines in India. It is but too well-known that there are numbers of reckless men among Americans both on and off railways, who neither value their own lives, nor the lives of other persons. It is not, however, the character of the men but of the system we should judge. Any system worked by reckless men may produce bad results.

An examination of the official report to the Governor of the State of New York for 12 months ending Sept. 1863, shows the following number of passengers and employes killed and injured on same lines as before quoted :—

|                         | Passengers |          | Employes |          |
|-------------------------|------------|----------|----------|----------|
|                         | killed.    | injured. | killed.  | injured. |
| New York and Erie ..... | 6          | 1        | 29       | 6        |
| New York Central .....  | 2          | 20       | 10       | 4        |
| Hudson River .....      | 2          | —        | 8        | 1        |
|                         | 10         | 21       | 47       | 11       |

On the New York and Erie two passengers were killed and one injured by an express train standing at Middletown Station being run into by an extra train. The other accidents were ordinary casual-

tries not arising from collisions. On the New York Central, two passengers were killed from ordinary casualties ; and the 19 injured arose from a train leaving the rails, possibly from a bad state of the permanent way. On the Hudson River, one passenger—a lady—was killed by a musket ball coming into the carriage from Yonker Barracks ; the other was killed from an emigrant train being run into by a goods train at Peekskill Station.

Now we have no accidents stated here but what may have occurred on a double line; hence it cannot be fairly said that the American system of working single lines gives rise to collisions between stations.

On the New York and Erie, as regards employes, five were killed and two injured by an engine exploding close to Jersey City. Two more employes were blown off an engine at Ramsey Station. Three employes were killed at Vails Gate by the wheels of a ballast train giving way and the train getting off the line. All the other deaths and injuries were casualties resulting from men tumbling off the trains, getting crushed in coupling wagons, jumping off trains in motion, or being accidentally run over. On the New York Central five employes were killed and two injured through falling off trains in motion ; one jumping off a train in motion ; three in coupling wagons ; and two injured and one killed by being accidentally run over. On the Hudson River two employes were killed by Engine "Sam Sloan" exploding. The other cases of killed and injured resulted from the same casualties as before stated.

I have thought it advisable to state these cases because there is a general impression that the results of American disregard of life are productive of more accidents than is really the case. Before going more into the detail of the American outside or executive system in the next paper, it is well to premise any further remarks on single lines by this close examination into the number and causes of the accidents on the three long lines of the State of New York.

~~E. B. IVATTS.~~

# INDIAN RAILWAYS.

## No. II.—WORKING SINGLE LINES.

*(From the Times of India, September 15, 1866.)*

IN continuing this subject, and going more deeply into technical details, the reader must understand that the intention of the paper is not to propose any pet system of the writer's for working Indian railway trains, as this is neither the time nor place to draw up rules for a new system. It would not be safe for Government nor for a Company to act upon the views and opinions of one man in a question of such importance. Besides, Indian prejudices against innovations are both strong and covert, and any new system, however good and true, put forward by a single individual, would be attacked unmercifully. Nothing less than a conference of Government officers and Indian railway managers would offer a safe basis for building up an improved system. It is therefore the object of this paper to show some of the faults of the present system, and to contrast it with the American, which the writer thinks will be sufficient to show the advisability of holding such a conference as that referred to above.

By section 29 of Act XVIII. of 1854 for regulating Railways in India, it is laid down as follows :—

“Trains moving in opposite directions shall invariably pass each other at the stations, and no engine with or without a train shall be permitted to leave one station for another until it shall be ascertained by means of the electric telegraph that the line between these two stations is clear of engines and trains and all impediments as far as can be known.”

This short Government regulation limits and controls the capacity of Indian railways, and prevents their being worked as advantageously as they might be. The principle laid down is good, but the way in which it is carried out is prohibitory ; whereas by a modification of the regulation, safety would be quite as certain and the carrying capacity of single lines would be largely increased. It

may fairly be questioned whether or not, when this section was framed, the gentleman who advised its adoption (probably an English Government railway inspector) had not in view the use of the signal telegraph indicating "line blocked" and "line clear" as used on the London and North-Western Railway between Euston (London) and Tring and on other lines, and whether he ever intended that a message of twenty words should be telegraphed between stations and the trains kept waiting until an answer should be returned. There seems nothing in the clause inconsistent with this rendering. Like many things in India, that which is designed to mean white is by some extraordinary and unlooked-for ratiocination contorted and construed to mean black, and thus a section of organization is suddenly turned upside down, rather to the quiet amusement of those for whom the organization is designed.

The progress of a train along Indian lines is regulated something after the following manner, although there may be variations on different lines. Before the train starts from, say, Station A, the telegraph operator directed by the station master telegraphs a message of from 10 to 20 words to Station B, asking if the line is clear for the train to proceed. Supposing B station master believes the line to be clear, he, through his telegraph operator, sends back a short telegram to say it is, and that the train may proceed. The A station master then signs a printed form with the blanks filled up, and gives it to the guard as authority for the train to proceed. The train passes on, and the B station master goes through the same process with C station master, and so on from station to station.

It must be borne in mind that the time-table lays down very distinctly the stations at which trains are to stop and pass each other and no trains but those on the time-table are allowed to be in motion, nor are likely to be run beyond the meeting and passing stations ; but, notwithstanding this, there is a block to a train's progress at every station which can only be removed by the native station master's agreeing by telegraph to each train passing forward. Each station consequently has to telegraph for each train to come on, and ask for authority from the next station for each train to be allowed to go forward. Hence, in the case of a railway having 50 stations, 100 telegrams have to be dispatched for each train passing along the line, and if there are six trains a day, then there will be 600 messages a day. As I believe no Indian line has a telegraph wire specially reserved for the movement of trains—which all our railways ought to have—ordinary messages have to pass along the same wire when it is not engaged with messages relating to the movements of trains. In practice it

very rarely happens that, when stations ask authority from other stations for trains to pass forward, it is refused. Hence the asking and granting of authority has become simply a form gone through by the native station masters. It is therefore generally done in such a manner that very little faith can be accorded to it, and if it were really necessary, and life and death often depended upon it, very many sad accidents would have to be recorded. I think it will be seen that safety is chiefly secured by guards and drivers not running trains beyond meeting and passing stations until they have really met and passed the trains, which it has been arranged they shall meet and pass at such stations. True, in case of accidents in some special cases, the telegraph sanction might enable a victim to be produced, but it would be exceedingly difficult in most cases to convict him. The two station masters or telegraph operators (native station masters at small stations themselves work the telegraph) would each swear the other was to blame. One would swear he never telegraphed authority for the train to pass on, the other swearing that he received the authority by telegraph. Unless a third person happened to read the message from the telegraph instrument when it was either sent or received, it would be next to impossible to fix the guilt on the culprit. Now with the Morse Telegraph Instrument, and stringent rules to insure the use and preservation of the paper ribbon on which the message would be printed, the case would be different. If the ribbon were destroyed by the man who made the error at Station A, it would *prima facie* show his guilt, which would be fixed by the production of the ribbon by the other man at B Station.

Thus we have a precautionary Governmental regulation only occasionally serviceable, and which as now carried out is uncertain in bringing the real offender to punishment, and which, by limiting the carrying capacity of Indian single lines, threatens to render necessary an expenditure of many millions sterling in doubling large sections of line. This will burden the capital accounts, so that remunerative dividends may never be earned, and the cost of the Indian railway system will be as so much money sunk. The Government and the Companies should pause and look at the evils that have arisen in England from excessive capital outlay, before pursuing a policy likely to lead to the same results here. If the Indian trunk lines are not to be commercial paying undertakings, then who is to make the branch lines? Will Government do this, or will Government continue the guarantee system without limitation? If the trunk lines are not made paying enterprises, then India must do with-



out branch lines, and the development of the country must be retarded, or Government must make them, or go deeper into guarantees. Let the trunk lines be made to pay, which there is reason to think can be done with single lines, and then capitalists will gain confidence and come forward to make the branch lines.

Now the dangers specially to be guarded against in working single lines are :—

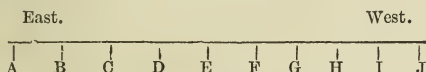
- (1). That of two trains going in opposite directions coming into collision between two stations.
- (2). That in case of an accident to one train, of its being overtaken between two stations and run into by another train.

The first danger is guarded against by the stringent rule, that trains are not without special orders to run beyond stations where the time-table shows they are to meet and pass other trains until such meeting and passing has taken place. If a bye-law were sanctioned by Government granting power to imprison any guard for a period not exceeding six months who might infringe such a rule, the rule would be made still more stringent than it now is. Act XVIII, section 25, gives power to transport beyond seas for life or imprison with or without hard labour for seven years, for endangering the safety of a passenger. But it is exceedingly difficult to satisfy judges and magistrates, who are necessarily unacquainted with the railway system as a whole, how the commission or omission of some apparently trifling duty involves a principle which endangers the safety of passengers, and unless some one is killed or wounded, judges and magistrates will not inflict suitable punishment ; hence the Act requires to be supplemented by a few bye-laws, setting forth clear issues, and awarding definite punishment for the same.

The second danger is not peculiarly a danger arising from the system of single lines. It is quite as much an element of danger on English double lines as on single lines, and indeed more so, because the speed of trains in England exceeds the rate of speed on all single lines. There is no reason why the precautions against this danger in England should not be applicable to India. The guard of a broken-down train in England protects his train from behind with detonating signals, and flags or signal lights ; and if there happens to be a signal telegraph between the stations, the breakdown is known in the following way :—Station A, when the train leaves, signals "train on—line blocked." This holds good until the train reaches Station B, who then signals back to A Station "Train off—line clear." If an extraordinary time elapses, and B Station does not report the arrival of the train after being asked whether or not it has arrived, men are sent along the line to see what is

the matter, and to render assistance. All this is just as applicable to Indian railways as to English, and the difference in the employes is *not* a reason why it could not be carried out here. The signal telegraph instruments, the same as used in England, should be introduced over all the Indian lines.

Supposing a section of single line running 100 miles east and west, with ten stations averaging 10 miles apart, and represented by the letters A to J, that A to J is eastwards, and J to A westwards.



Suppose we have five trains in motion going eastward and five trains going westward, in all ten trains during the day. The No. 1 train going eastward will have to pass the Nos. 1, 2, 3, 4, and 5 trains going westward. The No. 2 train going eastwards will likewise have to pass perhaps four, perhaps five, trains going westward, consequently there will be probably 25 passing appointments for the five trains going eastwards, and about the same number for the five trains going westwards; say 40 appointments to be kept at stations at particular times (hours and minutes) by the ten trains. Now it will readily be seen that if one train going east is late half an hour or an hour, most probably four trains going west will be detained the same time at the passing stations, and then in turn these four trains going westwards detain trains running eastwards, and the whole of the passing appointments become deranged. The time-table then becomes a dead letter, *and some trains have to be cancelled and not run*, until the late trains get to the end of the line, so that a fresh and clear beginning may be made next day according to the time-table; for it would only be making matters worse to keep all the trains running next day, so that the early day's trains of one day would get mixed up with the late day's trains (behind time) of the previous day. Now here is where the Indian working fails most deplorably. The officer whose duty it is to order the trains and regulate their working has other duties that urgently call off his attention, and hence he cannot give his undivided attention *day and night* to the movement of trains over 100 miles, and the consequence is that one or two failures of trains to meet their appointments in time are not foreseen and a remedy applied. Thus it happens that in two or three hours afterwards all the trains get off their time, confusion ensues, and the only remedy is to stop one or two trains running, and let the late ones work themselves out by running to the end of the line or section of line. The result of this is that the officer regulat-

ing the trains does not in future, so far as he can help, order more trains to run than he finds from experience will get along without much difficulty or complication. The consequence is, that if empty wagons are not worked into the interior, there can be no full ones to come back towards the seaboard, and the maximum work is not done. The fault is not in the officer ordering the trains, it is in the system. Besides his general work and regulating the trains during the day, he will during the busy seasons of the year be knocked up out of bed on an average four or five times every night with telegrams about trains. He is thus called upon in a state between asleep and awake after a hard day's mental work in a tropical country to give orders on which the lives of passengers and the safety of trains depend.

There cannot be a doubt but that the great secret in working the maximum number of trains over a single line, is the prompt application of a remedy when a train begins to lose time, and shows symptoms of being unable to make good its engagements in meeting other trains, and in this way anticipating and correcting the effect of one particular train being late, before it can interfere with the other trains. The object is to stop the first train which is late, from affecting the second train, and making it late too, besides affecting the third, and so on. Now let us consider how this is done in America.

In America there is an official called a "dispatcher," who is posted in a central position on the line, and regulates the movement of all trains in his district or division. He has a quiet office to himself with one or two telegraph operators. Some dispatchers have a small model of the line before them with the stations marked thereon, and with holes and pegs like a cribbage-board. Each peg is marked to represent a particular train, and there is a hole against the name of each station with a single hole between the names of each station for trains in progress between stations. The arrival at and departure from every station of every train is telegraphed to the dispatcher, and accordingly as the messages come in he moves his pegs on his board. If by chance he may leave the office for a minute, the model is fitted with a box cover, which shuts down and fastens with a spring lock, so that no person can meddle with the pegs. Some dispatchers carry the movement of the trains in their head, and do not use a model. The dispatcher has an assistant for night duty. These men have nothing to do but walk about their private office and watch the movement of the trains. They are quiet, and permitted to do nothing to take off their attention from watching the movement of the trains. If a dispatcher observes No. 1 train eastwards gradually losing time, and judges

that it cannot reach its "appointment" stations in time to meet the five trains coming westward, he telegraphs orders beforehand to the conductors of the trains coming westwards to come on, and he stops No. 1 eastwards. For instance, No. 1 eastwards has to meet No. 1 westwards at F Station. The dispatcher seeing that No. 1 eastwards is losing time and cannot keep the appointment in time, sends a telegraph order to D Station sufficiently early to intercept the train, and which the conductor of the train gets on his arrival there ordering him to stop his train at E Station instead of F Station, and there meet and pass No. 1 train westwards. When the dispatcher receives a telegraph acknowledgment, that the conductor understands the arrangement, which is an alteration of the time-table, the dispatcher then sends an order to F Station to the conductor of train No. 1 westward ordering him to run his train on to E Station, and there meet and pass No. 1 train eastwards. This order is likewise acknowledged by telegraph. The same process is gone through with all the "appointments" of the westward trains, which this late eastward train has to meet and pass. Thus the westward trains are not detained at all, the general working of the trains is not deranged, but No. 1 train eastward having first offended by being late, has to suffer all through the rest of the journey, and the whole burden or fault, if there is any, falls upon its conductor and driver. The dispatcher carefully watches the progress of this late train, and all the conductors of westward trains know by telegraph an hour or two beforehand that the No. 1 eastwards is late, and that they will have to pass it by special arrangement. Under this plan trains need seldom or never be cancelled, and the single line can be made to give passage to the maximum number of trains of which a single line is capable. Of course passenger trains always have the preference, and goods trains are put back sometimes, and inconvenienced to keep the road clear for passenger trains; but there being so few passenger trains in India compared to goods trains, there is a less number needing to have a preference, and therefore less chance of delay in the working of the whole number of trains.

E. B. IVATTS.





# INDIAN RAILWAYS.

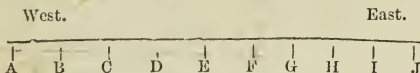
## No. III.—WORKING SINGLE LINES.

(*From the Times of India, September 28, 1866.*)

IN continuation of this subject, from which I had to break off somewhat abruptly in my last.

It has been suggested that it would have made my arguments stronger, had I taken for comparison American lines entirely single, the New York and the Erie, and the New York Central having probably more sections of double line than other American railways. I can only say that had the official returns been available, I should have preferred using them to prove facts which observation and experience in Canada have led me to believe before going into the statistics. Allowing a large deduction per cent. from the result of the American lines quoted, there is still a considerable increase over Indian lines.

The system for regulating the trains on the Great Western of Canada is, or was a few years since, for responsible station masters at central stations to be in charge of the movement and crossing of trains for a district on each side of their stations, extending, say fifty miles east and fifty miles west. As soon as trains come within their districts these particular station masters are responsible for them; in fact they are "despatchers." The Great Western of Canada used to run ten trains east and ten trains west every day on the main line, and the contingencies and delays in winter were most harassing, what with two or three feet of snow on the ground, chairs and tyres of wheels breaking with the frost, and feed pipes and water tanks getting frozen.



Now what do we find the plan in India? One plan is this, when No. 1 westward arrives at F station and No. 1 eastward has not come up and is very late, the F station master telegraphs to the officer who controls the trains. But this officer

generally has first to inquire by telegraph, *whereabouts No. 1 eastwards then is*. Suppose it is found No. 1 eastwards has only just left station A, having been late at starting. He then telegraphs and arranges that the trains shall meet and pass at C station; but in addition to advising C station master he has also to advise D and E station masters, otherwise, they will not give "line clear" for No. 1 westwards to run on to C station, it being contrary to the time-table. The guards are then advised through the native station masters, or if it chance to be a European station master then through him. By this plan, owing to the passage of the train not being telegraphed from station to station to the officer controlling the movement, that officer knows nothing of the irregularity until a stoppage has occurred, and before he can correct it, he must telegraph to four station masters, C, D, E, and F, while the first and last have to give written orders to two guards. There is no pre-arrangement, and the time occupied after No. 1 westwards has reached F station before any arrangement can be made causes such a delay as frequently to affect the other trains. In fact if No. 1 eastwards has left D Station there generally will not be sufficient time to make any arrangement until it has left E station, when it is too late to do anything, and the trains then jog on late as best they can, and there is a demand for double lines.

There is a strong disinclination in India to alter the meeting places of trains, as the officers who have it to do evade a duty which is a very responsible one and where any mistake may be serious. In this they are perfectly right, for unless their whole attention is riveted on the movement of trains under a better system, it would be highly unsafe to be constantly altering the appointments of trains. They would be likely inadvertently to make some mistake which might lead to very serious results. Another plan pursued is to leave the crossing of trains in the hands of the native station masters. For instance, if No. 1 westwards has arrived at F station while No. 1 eastwards has not arrived, then F station master telegraphs to E station master, and if No. 1 eastwards has not reached E station, the E station master agrees to

No. 1. westwards running on to his station, and if No. 1. eastwards arrives in the meantime he stops it, or if he does not an accident most likely occurs. Thus any native station master may alter the arrangements of the time-table, and in fact it is first train come, first train served, time-table or no time-table. I have no wish to disparage native station masters, though they have serious faults, but their lot is not always an easy one; they often have to be available for duty any time a train passes their station in the twenty-four hours, they are left to acquire railway knowledge by their intuitive perceptions, they get no organized training and pass no certified examination. Still it does appear the most reckless, over-confident system in existence, and unknown in connection with Canadian or American single lines. True, compliance is given to the Government rule, and if every thing goes on right, no two trains happen to be between two stations at the same time. When there are only three or four trains a day on a line, this system as well as many others of the same kind may work; but when there are ten westward and ten eastward trains on a section of 100 miles of line during the day, it appears that such a system would be highly dangerous to life and property. Native station masters may be well in their way, as far as their training and circumstances will permit, but to act suddenly and in emergencies when life and property is at stake, is a kind of responsibility that it is wrong and unfair to put upon them.

There are three systems of controlling the movement of trains (1) district dispatchers, (2) Station masters, (3) guards or conductors telegraphing one to the other. Now if the control and responsibility is fully given to one or the other, well and good; but under the Indian systems generally, the control is not so given; it is divided among the three, and like all systems of divided responsibility it is unsuccessful. The native or occasionally European stations masters control the movements of trains from station to station, the officer ordering trains controls the alteration of meeting and passing station, while the guard controls the actual movement of the trains upon written orders. Here we have a mixed system where the divided responsibility and power may work satisfactorily, if everything goes on without any hitch, but when the slightest hitch takes place the division of authority and the limitation of power leads to a check, a delay, and possibly utter confusion. The *onus* rests with no one. The officer controlling the trains does not know what progress they are making without special telegraphing to inquire, or unless a station master telegraphs for orders for a meeting appoint-

ment to be changed. A station master is in precisely the same position, for he does not generally know the whereabouts of any train, or what time it is keeping, until the next station master asks authority by telegraph for the train to pass on. The station master has no interest or responsibility in the movement of the train beyond sanctioning its passage to his station, and its departure therefrom, and then he has done with it. He is not to delay a train at his station, and he may contribute to its non-delay between his own station and the two stations on either side ; here his power ends. He is say one out of 50 station masters, and it is exceedingly difficult and nearly impossible in India to get 50 men to efficiently contribute piecemeal to the attainment of a result depending upon the performance of a particular duty within a particular ten minutes every day. This is more especially the case with natives, who have such a limited conception of the value of minutes. The guard working the train has less *onus* than anyone. He can but slightly contribute to the punctual working of his train. He can certainly hurry the movements of the passengers in and out his train and shut and lock the doors quickly, and endeavour to infuse energy into the station people, and ask the engine driver to try and make up ten minutes or a quarter of an hour by running more quickly ; but having done this he peacefully sits in his van and jogs on from station to station as the station masters give him written orders. He is generally a European, perhaps English trained, often in receipt of three times the pay of the native station masters from whom he takes his orders. Many a guard would gladly contribute to the punctuality of his train, and does so as far as he can, but he has little or no power to do so. He generally is not allowed to telegraph direct to the officer controlling the trains, although he can request a station master to do so. A guard may have had a first rate training and be a first rate man, but he has little or no opportunity for displaying his ability except in cases of accident. His limited influence over the progress of his train and its keeping time engenders a feeling of indifference, a want of interest and concern. He argues to himself " I can't help it if my train is detained here (say " C station ) an hour. What can a fellow do if the " station master won't give him ' line clear ' ? " It's not my fault, I can't be blamed, so I may as " well take it easy and not put my shoulder out."

There cannot be a doubt but that there should be power held on the train to contribute to its speedy passage and to meet contingencies regarding its progress. The present results indicate that sufficient power is not held on the train. There should be some one on every train, call him guard, conductor, or controller, to whom should be



given the greatest possible power to push on the train consistent with strict general rules to ensure general safety. This would then throw the responsibility on one set of men, all Europeans, and native station masters would be relieved of liability, and rules giving more discretionary power for working trains could be safely framed, as their movement would be entirely in the hands of Europeans. A few simple bye-laws clearly defining particular punishments for particular acts of carelessness would quickly produce a high state of discipline. No piecemeal organisation, where a large number of men have to contribute to one result, will work satisfactorily in India, especially when the result hangs upon time or the performance of a certain thing at a particular time. The outdoor executive system of working trains in India is defective, and no practical man of observation can fail to see it in passing over an Indian line. A general want of vitality is observable among all the people. The guard can do nothing until he gets his order to proceed, to hasten which he cannot contribute. He may often be seen lounging about the platform until the document is put into his hands. The native station-master fusses about and is anxious to see the train away, and a return of the stillness and inaction peculiar to Indian roadside stations situated on vast plains. The telegraph operator is rattling away at the handles of his instrument or filling in the blanks of the printed order.

On the East Indian line the order to proceed is telegraphed for when the train is perhaps ten miles away. For instance, when the train leaves station A then station B is addressed by telegraph, station B then telegraphs to station C to say the train has left station A and asks if the line is clear for the train to leave station C. Thus the order to proceed between station C and B may be given from half an hour to an hour before the train actually leaves station C, or it may meet with an accident and never leave station C at all. If an order based upon the fact of the line being clear is given an hour before it is required, who can say but that there may be an impediment on the line during that hour. Again, on the Bombay and Baroda line the Company have been required to run a quick train from Bombay to Ahmedabad, and this train runs past 19 stations throughout the journey without stopping. Leaving Broach it runs 32 miles and passes four stations; without stopping, which stations pass line clear one to the other until the station nearest to Broach gives line clear to Broach up to the fourth station but the train does not pass the fourth station until an hour after leaving Broach. It may be said that it does not matter, and that the fourth station master could



keep his end of the line blocked for 12 hours if necessary. True ; but if long sections of line are to be kept blocked in this way, how is the maximum tonnage to be got over the line ? Further, can the vigilance of station masters be kept up to a safe point when they know that trains will not reach them for an hour after they give line clear, and that they have plenty of time to get their shunting done between time ? Not only does this plan block thirty-two miles of line for an hour, but it prevents the four stations shunting trucks on to the main line during the same time. In the case in point, the stations being small ones it may not be necessary, but it is the principle to be considered. How is an express mail train to be got through from Calcutta to Bombay, if it is to block every thirty miles of line and the intermediate stations for an hour ? No doubt I shall be told that this is the very reason why a double line throughout must be made ; and under the present system of working no doubt it is true. It seems quite clear, that whatever Section 29, Act 18, may or may not be intended to mean, the way in which it is carried out must be questioned, and some alteration come to, or large sections of line must be doubled at considerable cost.

Having discussed the system, the appliances come next in order ; that is to say the rolling stock or waggon power and the passing stations and their distance apart.

The following table will conclusively show that the Indian lines have never had sufficient waggon power.

| Railway Companies.                  | Date of reports.                | Miles. | Total No. of Engines. | No. of goods waggons of ten tons capacity. | No. of English pattern waggons of five tons capacity. | Waggons per mile. |
|-------------------------------------|---------------------------------|--------|-----------------------|--|---|-------------------|
| New York Erie .....                 | Half of year ending Sept. 1863. | 459    | 242                   | 3,319                                      | ..  | 14*               |
| New York Central ...                | Do. ....                        | 555    | 239                   | 4,000                                      | ..  | 14*               |
| Hudson River .....                  | Do. ....                        | 144    | 68                    | 675  | ..  | 9*                |
| Great Western of Canada .....       | Half of year ending Jan. 1857.  | 283    | 86                    | 1,210                                      | ..  | 8*                |
| East Indian .....                   | Half of year ending Dec. 1864.  | 1105   | 328                   | ..   | 4,667   | 4                 |
| Great Indian P....                  | Do. Dec. 1865.                  | 601    | 143                   | ..   | 3,528   | 56.8              |
| Bombay, B. & C. I. .                | Do. ....                        | 306    | 49                    | ..   | 1,741   | 53                |
| Madras .....                        | Do. ....                        | 610    | 80                    | ..   | 1,815   | 23                |
| Inverness and Aberdeen Junction.... | Half of 1864 ....               | 233    | 55                    | ..   | 1,162   | 5                 |

It may be questioned whether in all cases and at all times the maximum work has been obtained from the waggon power, and the maximum trains run, yet there cannot be a doubt but that the number of waggons on several lines has never been equal to the requirements of the traffic, and that hence the maximum difficulties have not been felt in working the maximum number of trains over the single lines. When the rolling stock is doubled then will come the full strain upon the outside executive management, and the discovery of the impossibility of working ten waggons per mile under the present system if the waggons are quickly turned round. The demand for double lines will again arise with greater force, and from its reiteration with seemingly greater reason.

Several Indian Companies have made extraordinary exertions to increase their rolling stock ; but had the want been seen and pointed out earlier in India, instead of shortcomings being attributed to the single line, then earlier measures could have been taken to meet the deficiency. English railway companies with ready money can set the rolling stock companies to work and get a thousand waggons in a few months ; but in India it is very different. The ironwork has to be got out round the Cape, which from the date of ordering to its arrival takes nine to twelve months, and then the waggons have to be made, and the native carpenter labour (at least in Bombay) has been so exceedingly scarce that men who a year or two ago were glad to get eight to ten rupees per month, saucily demand rates equal to thirty rupees a month, and then often only work four days a week. It is difficult to understand why iron waggons have not been sent from England in pieces and fitted together in India. As there was plenty of work for the waggons to do, that could not, otherwise, be done, they would have earned money that now has not been earned. The different companies in their last reports show that large increases of rolling stock have been ordered, and it is to be hoped that a falling off in the growth of Indian cotton will not render them superfluous.

The distances between stations is another important feature in working single lines ; and the following comparison shows that about four-fifths of the stations on the American lines are between 1 and 7 miles apart, while the three principal Indian lines only average one-third, one-fourth, and one-fifth of their stations that are so near together as one to seven miles. It will be seen that two-thirds of the East Indian stations are from 8 to 14 miles apart, while two-thirds of the G. I. P. stations are 8 to 21 miles apart :—

|                         | No. of Stations<br>between 1 and<br>7 miles apart. | No. of Stations<br>8 to 14 miles<br>apart. | No. of Stations<br>15 to 21 miles<br>apart. | No. of Stations<br>beyond 22<br>miles apart. | Total Stations. | Total Mileage. |
|-------------------------|--|--|---|--|-----------------|----------------|
| New York Erie.....      | 72   | 13   | 2   | ..   | 87              | 459            |
| New York Central.....   | 59   | 12   | 1   | ..   | 72              | 555            |
| Hudson River.....       | 22   | 5  | ..  | ..   | 27              | 144            |
| Great Western of Canada | 30   | 10   | 2   | ..   | 42              | 283            |
| East Indian.....        | 18   | 74   | 7   | ..   | 99              | 1,105          |
| G. I. P. ....           | 13   | 24   | 16  | 3  | 56              | 601            |
| B. B. and C. I. ....    | 19   | 16   | 2   | ..   | 37              | 306            |
| Madras .....            | 15   | 31   | 5   | 1  | 52              | 610            |

If the three leading principles for working single lines, viz., good outdoor system, sufficient waggon stock, and passing places near together are neglected, it is absurd to say the single lines of India will not carry the traffic. It only shows that English people know nothing about working single lines, and Indian people are too proud or inert to borrow from America.

The goods traffic of Indian lines must always consist chiefly of agricultural produce (cotton, seed, and grain), and the amount of traffic the lines will develop is far larger than the traffic that originally found its way by bullock cart. Hence the lines are essentially "developers" of cultivation, and consequently by adding new stations, so that all stations may be only from 5 to 7 miles apart, will increase cultivation, develop traffic, and facilitate trains passing. It would be a wise measure to largely increase stations, provided the land of the district is arable, so that each new station will pay interest on its cost, and contribute revenue in addition to paying its own working expenses, and without unduly drawing traffic from other adjacent stations. If a district is not arable then it would be sufficient for passing trains to simply lay down sidings from five to seven miles apart for trains to meet and pass. Build wooden huts and place *signal* telegraph instruments in them which the guards could work. If Act 18, Section 29, should still be required to be carried out as at present, then a signaller must be kept at each hut. The points at such sidings could be kept locked, and only guards entrusted with duplicate keys so as to prevent accidents. In many cases the sidings could be put near to level crossings where gatemen are at present stationed and where there are roads, which in time, if not at once, would bring sufficient traffic to warrant the building of stations. But the more stations or sidings built the worse will be the effect of Section 29, Act 18, which requires trains to stop at such places, whereby quick trains in slackening speed to stop, in stop-

ping, and in getting up speed after leaving, will also five to eight minutes—so Section 29 practically prevents additional stations being made, and retards the cultivation and development of India.

In regard to the doubling of continuous sections of line, if it is the intention to ultimately make the lines double throughout, then it is right to double continuous sections; but if it is intended to add to the efficiency of single lines as single lines by adding sections of double line, then doubling continuous sections is a mistake.

Take a district of 100 miles of single line, now double 35 miles in the centre, and there will then be  $32\frac{1}{2}$  miles of single line at each end. This 35 miles in the centre will do away with about 30 per cent. of the "appointments" between east and west trains, because they will pass on the double line.

E. B. IVATTS.

# INDIAN RAILWAYS.

## No. IV.—ORGANIZATION—STAFF-TRAINING.

*(From the Times of India, October 27, 1866.)*

WHEN it is considered that native employees form about 90 per cent. of the working staff of Indian Railways, it may be worth while to enquire by what means they become acquainted with their business, and to what extent they are qualified for it.

In all large organizations where the combined action of individuals is necessary to produce results, the nature of the results must depend upon the efficiency or otherwise of such individuals. The production of the different parts of a watch is the work of many hands, and if the parts are accurately and well made a good watch may be put together. But supposed when the watchmaker takes the several parts and commences to put them together he finds many of the parts do not fit into each other, but display a general want of finish. Then must follow a process of cutting and contriving so as to adapt the several parts to each other, while some parts may have to be cast away as useless. This is analogous to Railway work with native staff. The work produced by the natives is somewhat like what is wanted, but it seldom fits together. The watchmaker has no small advantage over the Railway Manager, because the parts of his watch are all before him and he can see them at a glance: whereas the Manager's piece of mechanism is widely spread over the country, with the main spring at far away head-quarters and every station's work; forming an indicating dial marking the progress of the work but the numerous discrepancies indicated show that the hands of the dials never agree. By inspection, correspondence, and great labour, the hands may be quickly re-adjusted, but the correction has to be constant.

It unfortunately happens that railway service attracts only natives having the most elementary education and knowledge of English. Poor boys, often of good caste, present themselves, whose parents have only been able to send



them on an average from 6 months to two years to an English school, after perhaps some little home instruction in English from an elder brother or relation. Many of these boys when they offer themselves for employment, understand so little English as frequently to be unable to answer the questions put to them; their English composition is often ridiculous, they cannot write from dictation, and their handwriting is wretched. Their written applications are frequently penned for them, and almost invariably composed by a friend, relation, or paid scribe.

Some applicants are so poor and friendless that if it is the first situation they will serve as candidates for six months without pay, and as it were go to business school with the hope of getting Rs. 20 to 25 per month at the end of the six months. Often they or their friends have to borrow money from the Marwaree or Jew of India at high rates to support them during these months of probation. If they have been in some employment for a few months before joining the Railway, they are a shade better; but I am desirous of showing the character of the raw material when turned out of the educational mill to prey upon unhappy Railway Managers, and to meddle in a widespread intricate organization.

The better educated natives shun Railway service because the highest pay they can hope to receive does not exceed Rs. 80 to 100 a month, except in a few cases of clerks at the head offices; whereas in Government service they may work up to better salaries and get a pension after many years' service. Likewise in banks and commercial houses in Bombay they can work up to about Rs. 300 a month, besides having many opportunities of making money in other ways. Now it is quite clear that Railways can never offer such prizes as banks and commercial houses. Railways in England cannot do so for the same reason as in India, because they cannot afford it. Hence, as the raw material does not come to hand ready made, Railway Companies must prepare it themselves. To do this they must attach an Educational Department to their many other Departments, or Government schools must incorporate Railway business as an educational branch, the same as they do engineering.

Youths in many cases at the commencement display a desire to work and acquire a knowledge of their duties. They go into their work with the freshness and single-heartedness of youth. To acquire the elements of English has called forth some mental energy and application on their part which holds out for a short time in their new sphere of learning Railway duties. In the course of from three to twelve months, however, they acquire a smattering of their duties sufficiently to enable them to perform them mechanically. Then they throw off their zeal and become passive, and "*wait to be acted upon*" in all matters required of them. This is the predominant feature of an Indian Railway Staff, Printed orders, and lengthy verbal explanation confessed to have been understood, are disregarded in a most tantalizing manner; duties of little as well as of great consequence are alike neglected; to kind or harsh remonstrances although listened to attentively, appear to be forgotten a minute after utterance. They may fully recognize the value of money, but the amount to be made in Railway service by fair means compared with other services is certainly not large, and hence there is no inducement to draw forth their best efforts. For the same reason there is not as a rule any regret at losing their employment with the better educated natives.

The essence of Railway organization is the maintenance of the system by providing for perpetual change. This not only includes the invention of new plans and the alteration of old plans owing to the introduction of new circumstances, but



also the continual repair of failures and adjustment of errors ; for no system can be made to work perfectly without some discrepancies arising. This is where the native employe is next to useless. His head does not contain and follow the system in its entirety so as to enable him to mend and repair damages. Thus is lost one of the strongest corrective principles ; namely, that he who gives rise to errors shall have the labour and trouble of correcting them. Consequently, native employes of all classes are continually tearing and dislocating the system, while the European staff is constantly harassed in repairing damages. The one flounders about ignorantly, though with fear and trembling, while the other is fretting, and fuming, and fining. Misunderstandings arise, innocent men are punished or discharged, and a miniature reign of terror ensues. Indian Railway management and English Railway management are as different as possible. English management means steering the ship, at the same time looking out for a small percentage of damages ; Indian management is to let the ship drift with the current, keeping her above water by constant and continual " repair of damages." It is dangerous to carry skysails if a crew cannot reef them. It is dangerous to give the English standard of power to subordinate native employes if they do not know how to use it. Hence centralization.

The natural inaptitude of native employes to plan or order in their detail work, will take years to remedy. They seem to have no conception of the shortest way to get through their work. True, after having been once broken into a particular piece of work they will go on with it like a horse at a mill ; and however circumstances may change or the necessity for that particular piece of work cease, there will not be the slightest change on their part. Native employes possess average powers in the acquirement of mecha-

nical duties and good power in sustaining such duties, but they are wanting in the power to plan.

Punctuality and the value of time with Railway employes is a most vital principle, especially on single lines. Native employes generally cannot afford to buy watches and do not possess clocks in their houses, they estimate the time by the sun when it is up, and at night they cleverly guess the time to within an hour or so. Having arrived at the age of manhood at peace with Father Time, it is a trial to them to commence a disputation with him about minutes. To be tied to time is what a native does not fully understand, and to obtain punctual attendance at office in the morning is next to an impossibility. An appreciation of the value of time will do as much to improve India and its people as anything else, and its Railways and Telegraph will prove the pioneers to this result.

Indifference to the value of time produces a general want of punctuality in everything, duties get into arrears, and nothing is done in time ; and when pressure is brought to bear the work is hurriedly and imperfectly done. So it is with native employes : there is no promptness, things are not done at the time they present themselves, and are forgotten. Work accumulates, and then its quantity intimidates. A selection is made of such matters as at the time being there is a vigilant check upon, and matters that are not likely to be at once detected are often left undone. To get men to send in a particular return regularly once a week is only to be achieved after drilling them a month or two.

The management of Indian Railways entails a state of mind in which want of confidence has to be a leading trait. The freshly arrived Englishman has to realize to himself that everyone is waiting to be acted upon, and that nothing can be accepted as permanent. He will soon find if he does not, that the decaying principle is so much a feature of the country that disorder and disorganization rapidly ensue.

Competition and its stimulating effects is another comparatively absent principle in the native staff of Indian Railways as well as in the people of India. It is a principle which has the faintest possible action. A native employe does not understand straining his nerves to do more work than his fellows with the hope that it will make him more appreciated and lead to promotion. Its absence cannot originate in caste, because a man of one caste will not do it in competitive opposition to a man of another caste. It would appear that Orientals are too shrewd to allow themselves to be made the sport of competition, and their political economy does not seem to teach them that competition is productive of good to themselves as individuals, and their zeal is not to be drawn forth in that way. Native employes will not compete one against the other as Europeans do both at home and abroad, consequently an individual incentive so useful in keeping a body of men up to the mark in England is inoperative in India.

Among the natives generally, it is much to be regretted that there is a great want of truthfulness and candour, which is an explanation of the general want of confidence between Europeans and natives on both sides. Europeans expecting to meet with deceit and untruth adopt the same tactics to defeat it, and after a time become so accustomed to it that it becomes habitual in all transactions with natives. Sometimes the European gets the better of the native, and sometimes the reverse is the case. Thus originates a moral standard in the conduct of business far below what exists in England. Out of this state of things much misunderstanding must necessarily arise. Sometimes by withholding information and by indirect remarks, natives will allow their station-masters to drift into error, and make no attempt to put the matter in question right. Sometimes employes get a permanent impression that Europeans and their fellow natives are seeking to injure and ruin them, and that only by great cunning on their part will they be able to keep out of trouble. This after a time begets a corresponding desire to get the better of others.

The system of giving gratuities to superiors in return for favours having existed so many generations, has become a characteristic among the people and an element in the simplest transactions. To wit, a gateman at 8 rupees a month at an up country level crossing will imagine his gate a turn-pike, and has been known to levy a pie or two or what he could get from every cart that passed over the Railway, and in the reaping season to obtain one bundle of jowaree or other grain from each cart he allowed to pass over loaded with grain. A goods clerk has been known to deny the arrival of goods or refuse delivery of same until 'tipped.' Station masters, both European and native, have been known to refuse to accept and forward cotton or other goods until they shall have received so many rupees per waggon as an inducement. Coaching clerks have been known to exact more than the proper fare, and excess fares have been known to have been collected but never accounted for.

All this goes on *sub-rosa*, but now and then a glaring case crops out and the men get summarily dismissed and, when possible, punished. There being no law at present to punish bribery except in the case of public Government servants, men can only be punished when extortion is proved, and this is very difficult of proof. If there were no givers there would be no receivers; but but strange to say the people so recognize the the right of a man so make something by the office he holds, that they give and seldom or never complain,

except when an extravagant amount is demanded, and even then they often only lodge a series of anonymous complaints or perhaps give private information in person. They will not, however, furnish any proofs, nor be brought forward to face the acceptors of bribes.

While employees can supplement their pay and in time with care and limited exactions accumulate a little money, they feel no desire to acquire perfection in their business or to excel in it. All they aim at is to meet the most pressing wants so as to keep their situations. When the native public contribute to this state of things and give the chief officers of a Railway no opportunity to check such practices, little can be done. Excesses may be kept down, but there is an underlying chronic feature of disorganization throughout Indian Railway staff that is always liable to crop up at any time from changes of management, press of traffic, or other causes. And it is only honest European action that stops the advance of decay.

Native employees seem never to aim at approaching the European standard, and cannot be got beyond a certain stage of efficiency. It would be worth a trial for an Indian Company to send a dozen likely native employees to England for 18 months' instruction. There would be little difficulty in putting them to work in Railway offices in Manchester and Liverpool if their labour were given to the English Companies. The cost would only be their passages to and fro, and the payment for 18 months of the same salaries they received in India. They would be bound for a number of years before leaving India. If they turned out well, a dozen men might be always kept under training in England and drafted out. This would very much strengthen the staff. It would create a standard of native efficiency now unknown. Natives who had not been to England would more readily learn from their fellow natives who had, than as at present from Europeans. E. B. IVATTIS.



